# 7 Additional ESD Initiatives

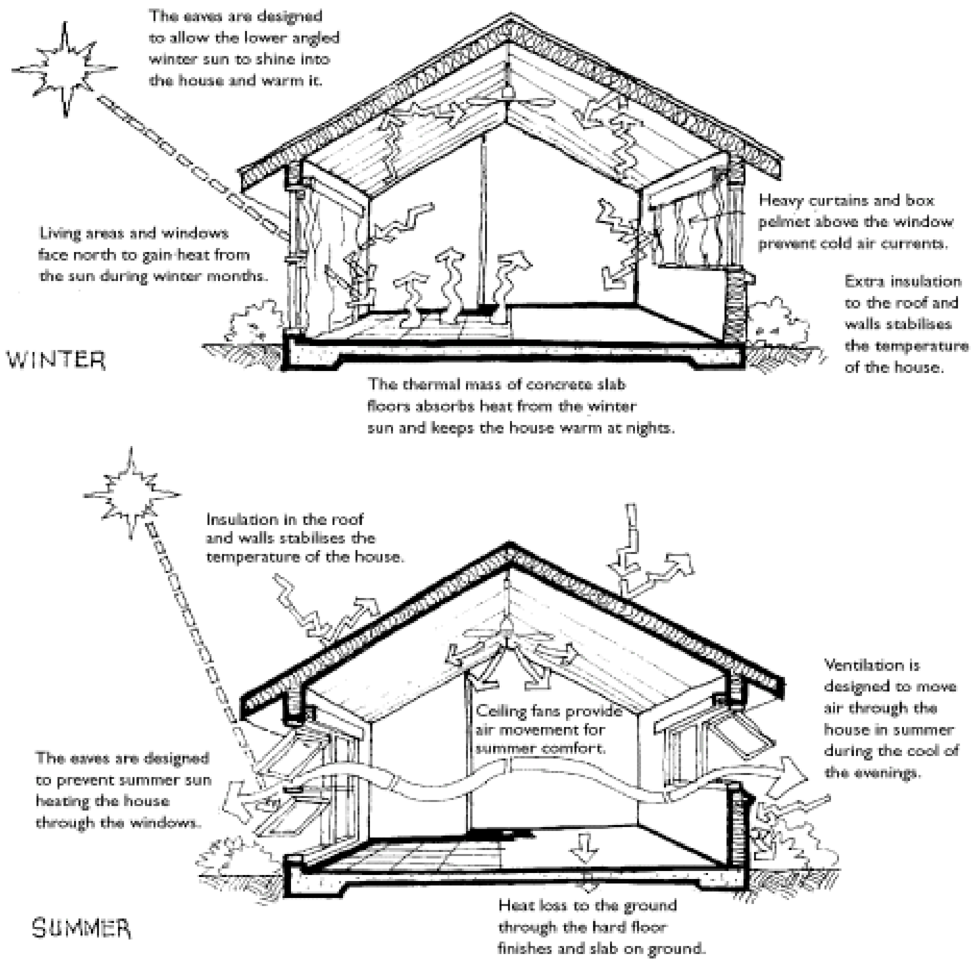
## 7.1 Building Form, Fabric & Orientation

The building's form, fabric and orientation will have a biggest influence on its thermal, comfort and environmental performance. A building with a carefully considered structure and orientation will perform far better than one where no consideration is given. The development will need to meet minimum requirements for BCA Section J for fabric and glazing as per the previous section.

Compensating poor building design using mechanical systems increases operating costs and does not necessarily provide adequate comfort, as occupants of many sealed glass buildings will testify.

The following factors have been considered in the design:

- Orientation
- Shading
- Structure
- Insulation
- Glazing




Principles of Sustainable Design

## Orientation & Shading

The optimum orientation for a building, in terms of solar gains, is within 20° east of north, and 10° west of north. Effective shading on glazing in this range can be achieved with an overhang-to-glazing-height ratio of around 1:2 (ie. A horizontal shade half as deep as the glazing height).

Beyond this orientation range shading of windows becomes more difficult due to the lower sun angles, especially in the early morning and late afternoon, and it may be necessary to introduce vertical fins or other operable shading elements (eg external blinds), depending on the orientation.

Solar access on shopfronts is often a major consideration for tenants. The main shopfront of the supermarket has an awning provided to protect the glazing from the morning solar gain.

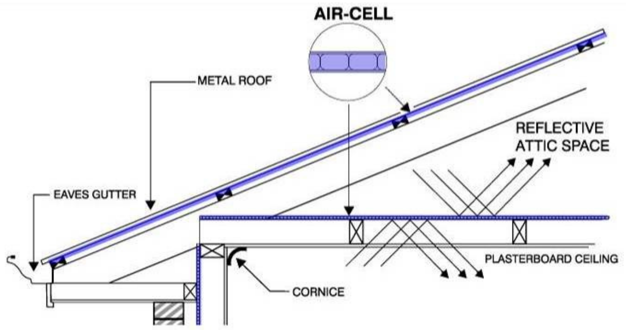
## Structure & Insulation

While the minimum BCA insulation requirements for retail development in Sydney are R3.2 for ceilings, R1.8 for walls, increasing these values will provide better comfort control and energy performance. This is to be investigated in the detailed design

Options for insulation include:

- Hybrid roof insulation
- Styrofoam insulation
- Bulk insulation

Hybrid roof insulation technology such as AirCell is typically less than 10mm thick and can be installed beneath the roof material as per the roof diagram below. The two layers will give a combined R-value of approximately R3.5 provided there is a suitable air gap between the layers (~ 50mm).




Typical section showing hybrid roof insulation

a) Hybrid roof insulation technology is typically a low volume, high performance insulation medium that combines reflective foil with low emittance, enclosed air and a thermal conduction barrier.

b) Styrofoam insulation is an extruded polystyrene product which offers excellent insulation for low weight and thickness.

Installation of Styrofoam Insulation System

Styrofoam is also ideal for "green roofs", protecting both the waterproof layer and the roof from moisture. It can be used with membranes such as *Proctor Sisalkraft714 Vapour Barrie*r (or equivalent products) to reduce condensation within a roof or floor cavity, which may need to be considered given the exposed nature of the pods.

c) Bulk insulation includes standard batts used commonly in residential applications. Polystyrene batts are thicker and also low-irritant. There are bulk insulation batts containing recycled content which may be considered for this project.

## Glazing

Choice of glazing appropriate to the orientation and local climate conditions will be vital in reducing heating and cooling energy consumption and maintaining occupant comfort.

Glazing may be described by the following properties:

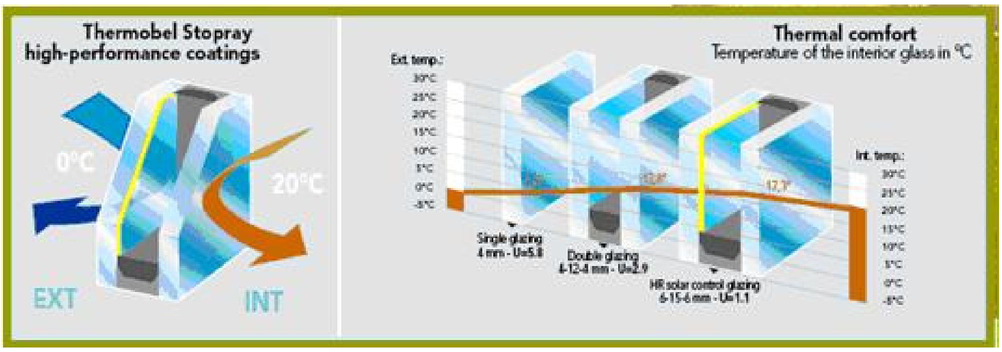
- Visible Light Transmission (VLT) – the percentage of visible light transmitted by the glass. The higher the VLT, the more daylight will enter the space.
- Shading Coefficient (SC) – the percentage of solar radiation that is transmitted through the glass. The lower the value, the less solar heat gain into the space.
- U-Value (U) – a measure of how much heat is passed through the glass. The lower the U-Value, the less heat is transmitted and the higher the thermal performance of the glass.

The use of glazing with a low SC will help to avoid heat gains in the summer, while glazing with a low U-value will reduce losses in the winter through the glass. Incorporating effective shading features into the design can avoid the necessity for low shading coefficients in the glass, which usually also decrease the VLT of the glass. To maximise the natural daylight within the shopping centre, VLT should be as high as possible.

It is anticipated that the glass utilised on vertical glazing will have as high a VLT, as low a shading coefficient and as low a U-value as practically possible.

Double glazing will reduce heat loss through the glass, correspondingly reducing the heating/cooling energy required. Occupant comfort will also be improved, by reducing the internal surface temperature of the glass and helping to avoid the "cold zone" often experienced near glazing in cold weather.

Glazing is available with various "Low-E" coatings, which can help reduce the shading coefficient. However, when exposed, these coatings must be cleaned with specific chemicals and are not particularly durable. This may render low-E coated glass as impractical due to maintenance and longevity concerns.




How performance double glazing works (image courtesy of Glaverbel)

The thermal performance of the window frame itself is an important consideration and the option of glazing with thermally improved frames will be studied. A further improvement being investigated is the use of thermally broken frames, particularly if a large amount of framing is likely, to increase overall U-value performance.

Investigation of higher performance glazing will take place during detailed design stage.

## 7.2 Indoor Environmental Quality

### Daylight, Glare & External Views

Good daylight in combination with views to the external environment can greatly enhance the ambience of a space and has been proven to increase sales within shopping centres. In addition, high levels of natural light reduce the need for artificial lighting, thereby reducing artificial lighting energy consumption.

To maximise daylight distribution within the building, there are several options which should be considered:

- Use glass with a high light transmission (see Section 5.3).
- Use light coloured, reflective finishes on internal surfaces.
- Where tenancies front have external shopfronts with shading, paint the underside of overhangs in a light colour to increase reflection into the interior and therefore the level of daylight entering each space.

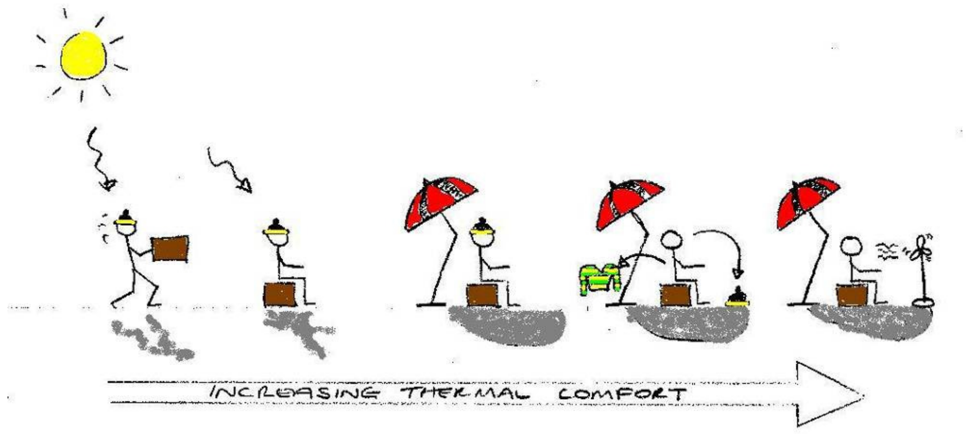
Glare control is also a factor which will be considered during detailed design stage

### Thermal Comfort

Thermal comfort is a highly subjective thing; one person's 'comfort' is another's 'too hot' or 'too cold'. A typical person's perception of comfort is influenced by six factors:

- Radiant temperature – the temperature of the surfaces around you, or radiant heat from the sun etc (45% of net comfort effect)
- Air temperature and humidity (35% of net comfort effect)
- Air movement, clothing & activity (20% of net comfort effect).

Most buildings in Australia have design criteria for comfort specified only in terms of air temperature and humidity.




| | | | | | |
|---|---|---|---|---|---|
| Activity: | Strenuous | Sitting | | | |
| Radiant Temp: | Direct Sun | | Shade | | |
| Clothing: | Warm clothing | | | Light Clothing | |
| Air Speed: | Still Air | | | | Pleasant breeze |
| Air Temp. | Constant (28˚C) | | | | |
| Humidity | Constant (say 50%) | | | | |

Changing perception of comfort for constant temperature and humidity.

It is impossible to control what occupants wear although it is reasonable to assume that they will wear warmer clothes in winter and lighter clothes in summer. The level of activity will also vary from person to person – from sitting or standing to window-shopping or brisk walking.

Thermal comfort can either be provided by passive or mechanical means. Passive means should be optimised before mechanical systems are designed, reducing operational energy costs, with potential plant reductions and reduced ongoing maintenance.

Passive heating and cooling begins with the building form. Section 7.1 describes the issues to consider when selecting building materials, insulation and glazing. Good insulation and glazing will not only reduce heat gain and loss, but will also moderate radiant temperatures from the walls, floor and ceiling.

## 7.3 Energy Savings

Greenhouse gas emissions are directly related to energy consumption. In Sydney, for every 1.1kWh of mains electricity consumed approximately1kg of $CO_2$ is released into the atmosphere.

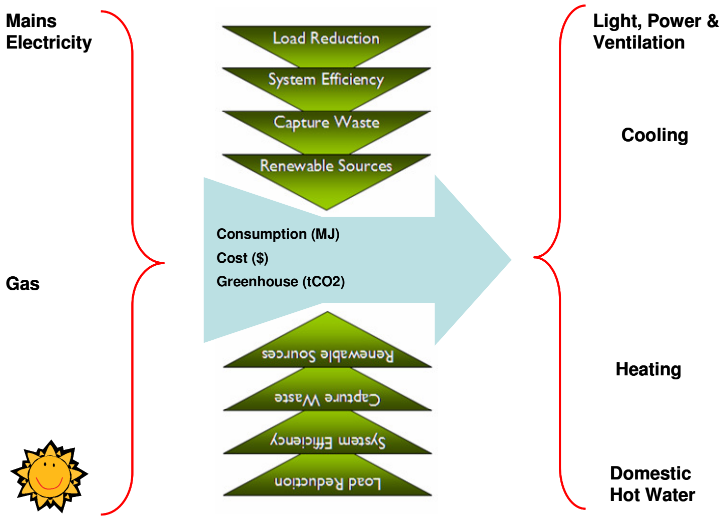
### Energy Efficiency Targets

The Building Code of Australia Section J sets minimum energy performance requirements for new retail development, which cover air-conditioning, ventilation, lighting, power and hot water, as well as building fabric considerations including thermal construction and insulation, building sealing, glazing and shading. The proposed design will be developed to meet or where possible exceed the BCA energy efficiency requirements.

Consideration will be given to further improvement in energy efficiency. The development will consider the following strategies to reduce its component of energy consumption.

Greenhouse reductions are achieved in a staged approach:

- Firstly a reduction in overall energy consumption through demand reduction and energy efficiency, then;
- A reduction in electricity and gas utility consumption through the use of onsite generation. This is to be considered during stage 2 of the development where load profiles are more suited to this type of initiative.




Approach to Greenhouse reduction

## Passive Design

Passive design reduces the amount of air-conditioning required and can have a marked impact on the building's energy consumption and greenhouse performance.

Please refer to Section 7.1 for details on passive design.

## Energy Efficiency

Energy consumption can be reduced through the efficient design of lighting, air-conditioning and ventilation systems, as well as water heating and other services. The development should be energy efficient in design and ongoing operation. The following initiatives will improve the energy performance of the building:

### Lighting

The proposed artificial lighting strategy for the facility should incorporate where appropriate highly efficient T5 fluorescent lighting or metal halides where appropriate. Low-power LED lamps should also be considered in feature lighting and are now available with excellent temperature control. Lighting power density will be required to meet BCA requirements.

Focus should also be placed on lighting controls including consideration of:

- Daylight dimming or extinguishing of external and streetscape perimeter lighting, as well as internal lighting adjacent to the skylights;
- Motion detectors in infrequently used spaces such as plant rooms, along with timer switches where appropriate;
- Localised light switching, with lighting zones to be ≤250m$^2$
- Central automatic timed control of lighting throughout the centre;

High efficiency fluorescent light fittings

### Heating, Ventilation & Cooling (HVAC)

Once building fabric has been optimised to reduced cooling loads, mechanical air-conditioning energy can be reduced by selecting efficient systems and plant equipment and by minimising the number of operating hours. The following energy initiatives can help to reduce air-conditioning energy:

- Each A/C unit to be within the top 10% of energy efficiency, with a high Coefficient of Performance (COP), particularly at part load (and use a zero ODP refrigerant).
- Install high-efficiency chillers;
- Variable Air Volume (VAV) air conditioning systems may be considered and adopted if deemed suitable for retail centre use;
- Outside Air supply can be controlled by $CO_2$ sensors to reduce energy consumption at part occupancy;
- Be zoned so that only occupied areas are cooled and so that spaces with different occupancy patterns or drastically different cooling loads are zoned separately. To achieve this, motion sensors and timers should be used to automatically switch off when parts of the centre will be unoccupied (Absence off control).
- A/C should have a simple control and be linked to a timer to turn off. The control strategy is “Absence Off”: manual on, manual off, auto off.
- A wider, internal temperature range will be considered. For example, when it is 36℃ outside, an internal temperature of 24 - 26℃ is considered quite comfortable by most people provided radiant temperature is reduced (e.g. no direct solar gain) and air movement is provided (e.g. natural ventilation or ceiling fans). This could use significantly less energy than trying to cool to a standard 22 - 24℃ throughout the year and lower in winter eg 19-21℃.

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### Domestic Hot Water

Domestic Hot Water energy provision from a gas instantaneous heating unit will be considered. Alternatively, around 70% of heating energy can be provided by solar hot water panels, using a gas-back-up.

### Retail Power

To help minimise and limit the retail power loads it is suggested that all retail premises be encouraged to comply with specific power load requirements depending on retail type.

## Energy Management

There is little benefit in designing an energy efficient building if the energy consumption is not metered, monitored and managed over time. Section 12 details our recommendations for long term management of the shopping centre.

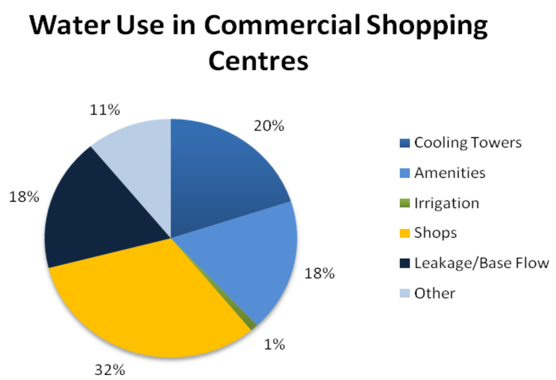
To enable the effective monitoring and tracking of energy consumption, sub-metering should be provided to every tenancy, as well as considered for sub-metering energy uses in the building greater than 100kVA. This will help identify areas of inefficiency with potential for improvement. Additionally, such an energy monitoring system may include the following:

- The power loads of each separate area of the centre;
- The lighting loads of each separate area of the centre;
- Any piece of equipment using over 100kVA;
- Condenser water temperatures to enable monitoring of the chillers/cooling tower interface.

## 7.4 Water Conservation

With many parts of Australia still in drought after 10 years, water conservation is a crucial aspect of sustainable design. Potable water use can be reduced by promoting a reduction in water consumption, installing highly efficient fittings and fixtures, and supplementing mains water use with alternative water sources.

The following graph shows typical water usage for shopping centres in Sydney, according to a survey conducted by Sydney Water.




**Water Use in Sydney Shopping Centres**

Source: Sydney Water

Water conservation is achieved in a two-staged approach:

- First reducing the inherent amount of mains or potable water consumed within the development through demand management, then;
- Substituting mains water required to meet this demand by harvesting and reusing rainwater.

### Demand Reduction

In order to reduce the overall water consumption, the following initiatives will be investigated:

- High efficiency fittings and appliances to reduce mains potable water consumption. Note that the WELS Star rating scheme replaced the AAAAA scheme as of July 2006. A list of rated products can be found at http://www.waterrating.gov.au/


WELS Water rating label sample

- Use of 3 / 4.5L dual flush toilets;
- Use of 0.8L low flush urinals or waterless urinals;
- Showers with a maximum flow rate of 7.5 L/min (e.g. *Ecoshower*);
- Wash hand basin faucets with a maximum flow rate of 4 L/min;
- Cleaners and kitchen taps with a maximum flow rate of 6L/min;
- Drought resistant (xeriscape) plants and grass for gardens and landscaping where appropriate;
- The following practices for all sprinkler, micro spray, sub-soil drip system or any other watering system:
  - On-site rainwater storage tank supply; and/or
  - Usage on alternate days between the hours of 10.00am and 5.00pm;
- Installing watering systems with either a rain sensor or soil moisture sensor as part of the control system;
- Cleaning of paved areas with an alternative to water unless cleaning is required as a result of an accident, fire, health or safety hazard, or other emergency;
- Consideration of flow shut-off device for all hoses;
- Consideration of water-efficient cooling towers that achieve 6 cycles of concentration or more.
- Non potable water for cooling tower make up.

## Rainwater & Stormwater Recycling

Water can be divided into two main uses – potable (drinking standard) and non-potable. Of the water usage predicted for the shopping centre, only the kitchen and bathroom basins require a potable water supply. The remaining consumption may be supplied via non-potable sources, such as rainwater tanks.

Rainwater could be harvested from suitable roof areas to supply toilet-flushing and landscape irrigation for the development, reducing the quantity of high quality drinking water that is used for these functions.

## Tracking and Monitoring

Sub-metering on major water uses can reduce the considerable water losses that occur in shopping centres through leakage. In addition, they will allow water efficiency measures to be monitored and tracked. Sub-metering all major water uses, including major tenants, food preparation facilities, car wash facilities, bathrooms, cooling towers, washdown facilities, and irrigation systems will be investigated. Meters should be connected to the BMS for leak detection purposes.

The overall water strategy for the building should be developed during detailed design, based on available roof area for rainwater harvesting and detailed calculations of demand for irrigation, toilet-flushing and wash-down.

## Groundwater & Stormwater management

Stormwater run-off can have a major impact on the environment. Untreated stormwater from roads and other paved surfaces runs directly into the local stormwater drainage system, taking with it harsh chemicals and increasing the demand on an often already struggling system.

Reducing the amount of stormwater leaving the site can be quite easily accomplished through careful design of surface and run-off systems.

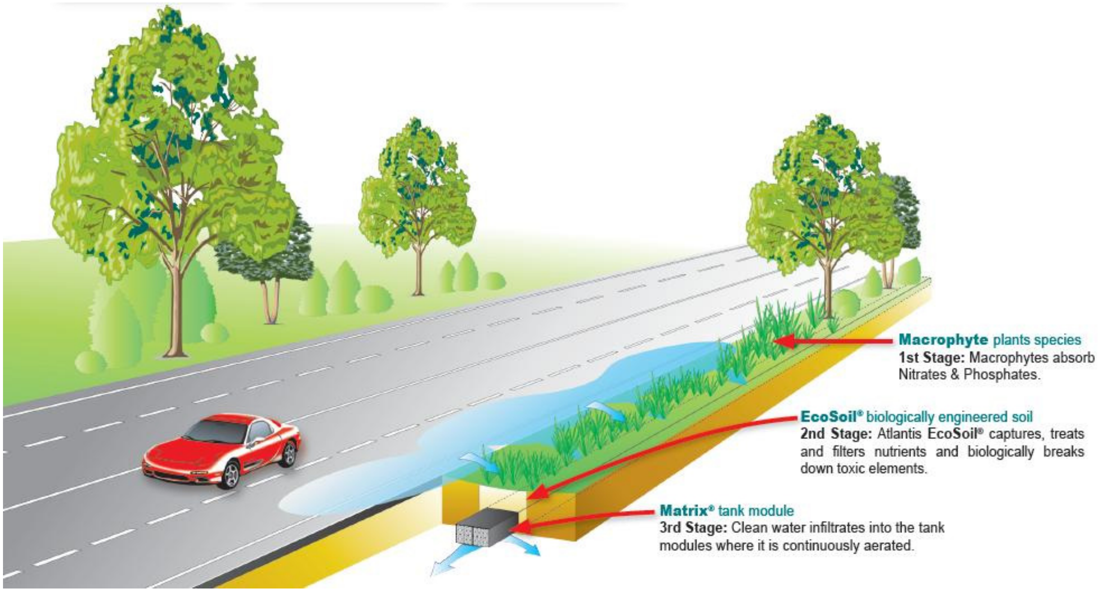
The use of pervious surfaces (in new landscaped areas) can allow stormwater to seep directly into the earth and help to recharge and dilute the saline watertable. The ground acts as a natural filter for any excess water before it enters the water table. Pervious surfaces could include carparks, walkways and traffic thoroughfares.


Permeable surfaces. Image courtesy of Atlantis

Roadside curbs can be made from pervious swales rather than the standard concrete drainage system. This allows water to seep directly into the earth, again reducing stormwater run-off from the site. Careful selection of plants and soils will filter the water from harmful chemicals and oils prior to the water dispersing into the surrounding earth.

These types of swales for roads on the development will be investigated.

It is understood that there may be high amounts of contaminants on major roadways, and this should be a factor of consideration when investigating such systems.

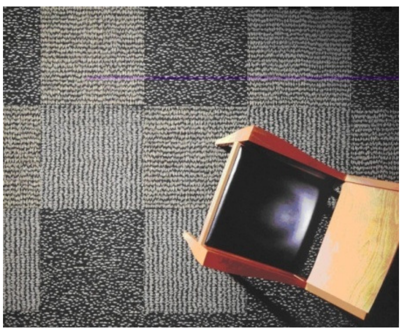



Roadside water retention system (Image courtesy of *Atlantis*)

## Sustainable Building Materials

In addition to fitness for purpose, economy, aesthetics and availability, the selection of construction materials should reflect upon the issues of the material's environmental credibility and impact on Indoor Environmental Quality (IEQ), including:

| | |
|---|---|
| *Resource Extraction* | (e.g. ecological sensitivity? old-growth forest, scarce minerals?) |
| *Future Recyclability* | (e.g. Can it be dismantled, recycled, and survive churn?) |
| *Recycled Content* | (e.g. is primary resource consumption thereby reduced?) |
| *Durability* | (e.g. Will it last?) |
| *Toxicity* | (e.g. PVC use, VOC's, cleaning products & off-gassing) |
| *Waste* | (e.g. Standard dimensions used to minimise off-cuts?) |
| *Cost* | (e.g. capital, maintenance & life-cycle cost impacts?) |
| *Emissions* | (e.g. Greenhouse & Ozone impacting gases) |
| *Embodied Energy* | (e.g. energy consumed in manufacture and distribution) |



It is recommended that as much construction as possible be prefabricated and installed completed to minimise construction work and material waste on site.

Specific construction materials are discussed in the following sections.

## Sustainable Timber

All timber should be supplied from sustainable sources including Forestry Stewardship Council (FCS) certified plantation timbers and recycled products. No timber (either solid or veneer form) should be sourced from rainforests or old-growth forests. Tropical rainforest timbers, including species Meranti, Merbau, Philippine Mahogany and Chengel should not be used for construction or second fix purposes. The following are accepted plantation timber species:

- Pinus radiata (exotic)
- Pinus elliotii (slash pine, exotic)
- Arakaria cunninhamii (hoop pine, native)
- Cypressus macrocarpa (Monterey Pine, exotic)
- Sydney Blue Gum (NZ grown only)
- Eucalyptus Cladocalyx (Sugar Gum, native, available through Smart Timber, Colac)
- Eucalyptus Globulus (Tasmanian Blue Gum when sourced from mainland plantation)

If the species of timber used is not on this list, the following evidence should be sought:

- Certification from the supplier that the timber is post-consumer recycled, with the source identified, preferably certified by the Forest Stewardship Council
- If the timber is native to and grown in Australia, chain-of-custody certification shall be provided from the place of harvesting to the point of sale.
- Certification as to the plantation status of the timber.

Additionally, the utilisation of reconstituted timber veneer products should be considered.

## Plasterboard

Products containing high-recycled content should be considered for all plasterboard installations.

## MDF

Products containing little or no formaldehyde (i.e. E1 or E0 board) should be considered for all MDF installations.

## Paints and Adhesives

Use of low VOC and water-based products is preferred to oil based paints, stains or sealants, to reduce the need for the use of mineral based solvents and unwanted off-gassing.

VOC's should be limited wherever possible to the values specified in the Green Star rating framework, shown below:

Paints (Maximum Volatile Organic Compound (TVOC) g/litre of ready-to-use-product)
Walls and ceilings - interior semi gloss: 16
Walls and ceilings - interior low sheen: 16

Walls and ceilings - interior flat washable: 16
Ceilings - interior flat: 14
Trim - gloss, semi gloss, satin, varnishes and wood stains: 75
Timber and binding primers *30
Latex primer for galvanized iron and zincalume: 60
Interior latex undercoat: 65
Interior sealer: 65
One and two pack performance coatings for floors: *140
Any solvent-based coatings whose purpose is not covered in table: 200
* EU directive

Sealants/Adhesives (Maximum Volatile Organic Compound (TVOC) g/litre of ready-to-use-product)
Indoor Carpet Adhesive: 50
Carpet Pad Adhesive: 50
Outdoor Carpet Adhesive: 150
Wood Flooring Adhesive: 100
Rubber Flooring Adhesive: 60
Subfloor Adhesive: 50
Ceramic Tile Adhesive: 65
Cove Base Adhesive: 50
Dry Wall & Panel Adhesive: 50
Multipurpose Construction Adhesive: 70
Structural Glazing Adhesive: 100
Architectural Sealants: 250

## Steel

Steel used in the project should seek to be sourced from recycled suppliers according to the following criteria:

- 60% of all steel used (by mass) to have a recycled component of 50% or more.

## Concrete

Concrete used in the project should seek to be sourced from recycled suppliers according to the following criteria:

- 20% of cement used for in-situ concrete and 15% of cement used for pre-cast concrete is replaced with industrial waste product; and
- 20% of aggregate to be used is recycled aggregate (classified as Class RCA in accordance with HB 155-2002).

## Tenancies

While difficult if not impossible to control individual tenancies, efforts will be made to educate and encourage tenancies to adopt the above principles in the fitouts.

# 8 Appendices

# Appendix A – BCA J2 Glazing tables

## GLAZING CALCULATOR FOR USE WITH CLAUSE J2.4, BCA VOLUME ONE (METHOD 2)

HELP

Building name/description: Wolli Creek Stage 1 Supermarket

Climate zone: 5

Storey: 1

| Facade areas | N | NE | E | SE | S | SW | W | NW |
|---|---|---|---|---|---|---|---|---|
| Option A | | 52.5m² | | 350m² | | | | |
| Option B | | | | | | | | |
| *Glazing area (A)* | | *16.7m²* | | *168m²* | | | | |

Number of rows preferred in table below: 3 *(as currently displayed)*

| GLAZING ELEMENTS, ORIENTATION, SIZE and PERFORMANCE CHARACTERISTICS | | | | | | | | | SHADING | | CALCULATED OUTCOMES - OK (if inputs are valid) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Glazing element | | Sector faced | | Size | | | Performance | | P&H or device | | Shading | | Multipliers | | Size | |
| ID | Description (optional) | Option A facades | Option B facades | Height (m) | Width (m) | Area (m²) | Total U-Value (NFRC) | SHGC (NFRC) | P (m) | H (m) | P/H | G (m) | Heating ($S_H$) | Cooling ($S_C$) | Area used (m²) | Element share of % of allowance used |
| 1 | W01 | SE | | 3.40 | 19.00 | | 6.5 | 0.70 | | | | 0.00 | 1.00 | 1.00 | 64.60 | 45% of 90% |
| 2 | W02 | NE | | 3.80 | 4.40 | | 6.5 | 0.59 | | | | 0.00 | 1.00 | 1.00 | 16.72 | 100% of 99% |
| 3 | W03-W10 | SE | | 3.40 | 30.40 | | 6.5 | 0.70 | 2.800 | 3.400 | 0.82 | 0.00 | 0.61 | 0.52 | 103.36 | 55% of 90% |

**IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR**
The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters.
While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all.
Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

*if inputs are valid* ✓

## GLAZING CALCULATOR FOR USE WITH CLAUSE J2.4, BCA VOLUME ONE (METHOD 2)

HELP

Building name/description: Wolli Creek Stage 1 Retail

Climate zone: 5

Storey: 1

| Facade areas | N | NE | E | SE | S | SW | W | NW |
|---|---|---|---|---|---|---|---|---|
| Option A | | 115m² | | 123m² | | 56.6m² | | |
| Option B | | | | | | | | |
| *Glazing area (A)* | | *35.3m²* | | *60m²* | | *23m²* | | |

Number of rows preferred in table below: 6 *(as currently displayed)*

| GLAZING ELEMENTS, ORIENTATION, SIZE and PERFORMANCE CHARACTERISTICS | | | | | | | | | SHADING | | CALCULATED OUTCOMES - OK (if inputs are valid) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Glazing element | | Sector faced | | Size | | | Performance | | P&H or device | | Shading | | Multipliers | | Size | |
| ID | Description (optional) | Option A facades | Option B facades | Height (m) | Width (m) | Area (m²) | Total U-Value (NFRC) | SHGC (NFRC) | P (m) | H (m) | P/H | G (m) | Heating ($S_H$) | Cooling ($S_C$) | Area used (m²) | Element share of % of allowance used |
| 1 | W11 | SW | | 2.80 | 4.40 | | 6.5 | 0.70 | 1.200 | 4.800 | 0.00 | 2.00 | 1.00 | 1.00 | 12.32 | 54% of 79% |
| 2 | W12 | SW | | 2.80 | 3.80 | | 6.5 | 0.70 | 1.200 | 4.800 | 0.00 | 2.00 | 1.00 | 1.00 | 10.64 | 46% of 79% |
| 3 | W13+W17 | SE | | 3.80 | 5.60 | | 6.5 | 0.59 | 1.200 | 4.800 | 0.25 | 1.00 | 0.99 | 0.97 | 21.28 | 35% of 99% |
| 4 | W14-W16 | SE | | 3.80 | 10.20 | | 6.5 | 0.59 | 1.200 | 4.800 | 0.25 | 1.00 | 0.99 | 0.97 | 38.76 | 65% of 99% |
| 5 | W18 | NE | | 2.80 | 3.80 | | 6.5 | 0.59 | 1.200 | 4.800 | 0.00 | 2.00 | 1.00 | 1.00 | 10.64 | 30% of 95% |
| 6 | W19-W20 | NE | | 2.80 | 8.80 | | 6.5 | 0.59 | 1.200 | 4.800 | 0.00 | 2.00 | 1.00 | 1.00 | 24.64 | 70% of 95% |

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*if inputs are valid* ✓

# Appendix B – Glass references for BCA J2 DTS Assessment